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PRESTWICH'S "GEOLOGY"

Geology: Chemical, Physical, and Stratigraphical. By Joseph Prestwich, M.A., F.R.S., F.G.S., Correspondent of the Institute of France, Professor of Geology in the University of Oxford. Vol. I. *Chemical and Physical.* (Oxford: Clarendon Press, 1886.)

THE last few years have been signalised in the annals of geological science by the publication of a number of excellent treatises and students' text-books. Not to mention the appearance of new editions, admirably brought up to date, of such deservedly popular works as Dana's "Manual of Geology," and Credner's "Elemente der Geologie," and of the "Geology for Students and General Readers" of Prof. Green, which is unfortunately still incomplete, we have the revisions of Lyell's "Students' Elements of Geology" by Prof. P. M. Duncan, and of Phillips' "Manual of Geology" by Prof. Seeley and Mr. Etheridge, in which last the additions and alterations are so numerous as to make it practically a new work; among text-books altogether new must be especially noticed the valuable and almost encyclopædic treatises of Dr. Archibald Geikie and Prof. de Lapparent—the necessity for works of this class being shown by the fact that in the course of less than four years they have both reached a second edition. As compared with all these works, however, the new treatise by Prof. Prestwich will be found to cover a somewhat different ground, and indeed to occupy a perfectly unique position among them. It deserves, therefore, to be regarded from another point of view, and to be judged by a somewhat different standard from any of them. Its author is the acknowledged Nestor of British geology, and it may be safely affirmed that no living geologist has contributed in a greater degree to the advance of the science by his important original researches. More than fifty years have elapsed since his first original contribution to geological science was published, and from that date forward his activity has been ceaseless; it is worthy of remark, that while his earliest papers were occupied with the description of some of the oldest formations—the Old Red Sandstone of Banffshire, and the Carboniferous of Coalbrookdale—his later researches have been devoted to the Tertiary and post-Tertiary deposits. But among the writings of Prof. Prestwich will be found some of the most philosophical contributions to geological literature—among which may be especially cited his memoirs on the circulation of underground waters, on the thickness and extension of deep-seated rock-masses, and on the age and relations of the deposits which have yielded the oldest known relics of the human race. A general survey of the wide fields of geological science, by one so especially qualified to undertake the task, may be expected to be of the greatest interest and value; and the expectation is not disappointed by the work now before us.

Upon the death of Prof. Phillips, the University of Oxford, in seeking for a worthy successor to that erudite and versatile geologist, wisely determined to invite Mr. Prestwich to accept the vacant Chair. His able inaugural dissertation on "The Past and Future Work of Geology," which was published in 1875 (see NATURE, vol. xi. pp. 290 and 315), sufficiently informed the world of the position with regard to the different schools of geological philosophy which the new Oxford Professor was prepared to take up. In the present work we find his matured conceptions of the subject, tested in the best possible manner as to their mode of presentation, by having been made the basis of a number of successive courses of University teaching. Every geologist will turn with interest to these pages, and even where they feel compelled to differ from the conclusions arrived at by their author, will render a just homage to the great learning and the judicious thought which are everywhere conspicuous in them.

In the plan of the work, we think Prof. Prestwich has shown the soundest judgment. After a brief introduction treating of the objects and methods of the science, the author proceeds to "give the reader a general sketch of the nature and distribution of the materials with which the geologist has most commonly to deal;" by the avoidance at the outset of difficult and doubtful questions of cosmology, and by reserving those "theoretical questions connected with cosmical and physical phenomena, which relate to the evolution of the globe and historical geology" to the end of the work, he best consults the needs of students—leading them up gradually from a survey of what is simple and known to a consideration of what is complex and unknown.

The two chapters dealing with chemistry, mineralogy, and petrography, large portions of which are printed in small type as being unnecessary for the general reader, would have proved more satisfactory if the author had been more fortunate in the selection of his authorities. Recent researches in those departments of science have been so numerous and of such importance, that few geologists would regard the "Gesternlehre" of Cotta, or the rehabilitation of Cordier's work by Charles D'Orbigny, as affording a sound basis for a summary of the present state of knowledge on these subjects.

But when the author comes to a discussion of the results of the decomposition of the igneous and metamorphic rocks, he is dealing with questions to which he has evidently devoted a large amount of personal study, and his own observations are of the highest value, while his citations from the works of other authors, are in nearly all cases of a very judicious character. The line of argument adopted in the work is necessarily interrupted for a time by the necessity for giving some account of the "place and range of past life," and here, as in the chapters dealing with minerals and rocks, the author has perhaps not consistently followed the best guides. But in the chapters on the formation of sedimentary strata, on the relations of littoral and deep-sea deposits, and on meteorological agencies and the circulation of underground waters, we recognise the hand of a master; and these portions of the work will be found to be worthy of the most careful study. In the very excellent chapter on ice and ice-action, we find many quotations from recent authorities on the subject; and some very interesting illustrations and descriptions are taken from Kane's "Voyages."

In the chapter on volcanoes, the author explains the theory which he first broached at the York meeting of the British Association, and which he has since elaborated in a paper read before the Royal Society. Upon this subject, as well as upon numerous others discussed in the

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remaining chapters of the volume, geologists will be glad to have brought together the results of the author's extensive study and exceptionally wide experience. While every one will be glad to see the excellent use which has been made of the splendid researches of Delesse and Daubrée, it might perhaps have been better if the author had relied less implicitly upon some others among the older school of French geologists. All will look forward with interest to the appearance of the second and concluding volume of the work, which will treat of stratigraphical geology, and the broader and more theoretical aspects of the science.

The present volume is worthy of the University Press, from which it is issued: well printed upon excellent paper, and illustrated by numerous woodcuts; these have been derived from other standard works, or are founded on sketches by the late Dr. Buckland, while not a few of them bear testimony to the fact that recent publications, like those of the U.S. Geological Survey of the Territories, have been freely placed under contribution; the general appearance of the book is all that could be desired. Among the six excellent folding plates, the first place must be assigned to the beautiful reproduction, on a small scale, of Marcou's geological map of the world, which has been revised by its author for the present work.

We cannot better conclude this notice of a very important contribution to geological literature than by quoting the sentences in which the author himself defines his position towards the different schools of geological thought.

> "The fundamental question of *time* and *force* has given rise to two schools, one of which adopts uniformity of action in all time,--while the other considers that the physical forces were more active and energetic in geological periods than at present.
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> "On the Continent and in America the latter view prevails, but in this country the theory of uniformity has been more generally held and taught. To this theory I have always seen very grave objections; so I felt I should be supplying a want by placing before the student the views of a school which, until of late, has hardly had its exponent in English text-books.
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> "The eloquence and ability with which uniformitarianism has been advocated, furthered by the palpable objections to the extreme views held by some eminent geologists of the other school, led in England to its very wide acceptance. But it must be borne in mind that uniformitarian doctrines have probably been carried further by his followers than by their distinguished advocate, Sir Charles Lyell, and also that the doctrine of non-uniformity must not be confounded with a blind reliance in catastrophes; nor does it, as might be supposed from the tone of some of its opponents, involve any questions respecting uniformity of law, but only those respecting uniformity of action.
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> "I myself have long been led to conclude that the phenomena of geology, so far from showing uniformity of action in all time, present an unceasing series of changes dependent upon the circumstances of the time; and that, while the laws of chemistry and physics are unchangeable and as permanent as the material universe itself, the exhibition of the consequences of those laws in their operation on the earth has been, as new conditions and new combinations successively arose in the course of its long geological history, one of constant variation in degree and intensity of action."

Extreme Catastrophists—if indeed any such have escaped extinction during the evolution of modern geological philosophy—will find little in the way of comfort in the above sentences, or indeed in any part of the volume before us. The most pronounced Uniformitarian, on the other hand, will find equally little to take exception to in the general tone of Prof. Prestwich's conclusions; he will perhaps only ask that before recourse is had to non-uniformity in the action of existing causes, the incompetency of the uniform action of those causes to produce any particular phenomena shall be distinctly demonstrated.

THE PICTORIAL ARTS OF JAPAN

The Pictorial Arts of Japan. With 80 Plates and Chromolithographs, and numerous Engravings on Wood and Copper, and with General and Descriptive Text. By W. Anderson, F.R.C.S., late Medical Officer H.M. Legation in Japan. To be complete in 4 parts. Part I. General History. (London: Sampson Low, 1886.)

OF the aboriginal inhabitants of Japan we know but little. A Polynesian element with some Melanesian admixture probably predominated in the southern, as an Aino element did in the northern, islands. Of the latter race the shell-mounds that line the coasts of the main island have afforded many interesting relics, among others fragments of pottery showing a simple ornamentation recalling the zigzags and curves characteristic of the Zuñi and Tesuke pottery of Arizona and New Mexico. It was in the main island, often called Hondo, that the history of Japan began. Not more than two or three centuries probably before the compilation in the eighth century of the Kojiki, the oldest extant document in Japanese literature, a colony of Ural-Altaic origin occupied the broad plain that extends from the northern shores of the Japanese Mediterranean to the foot of the Kiyoto hills. Tradition points to previous settlements of the strangers on the southern islands, whither, pushed by some Central Asian stress from their former home in the Korean peninsula, they had wandered across the narrow waters that separate the Land of Freshness from the Land of Dawn. The new-comers did not easily subdue the Aino tribes, remnants of whom in the north and east still existed, when Yoritomo was created Barbarian-beating Generalissimo in the thirteenth century. More or less amalgamation took place between conquerors and conquered, but the former did not wholly lose their purity of blood, and, to this day, broad physical differences distinguish the peasantry from the more aristocratic strata of the population—differences amply and graphically rendered in the innumerable drawings of Hokusai. These founders of the Japanese State, which, despite the assertions of native writers, can boast of no high antiquity, were a simple folk, living principally on fish and the produce of the chase, clothed in hemp and cloth made of broussonetia bark, and dwelling in wattled huts roofed with bark and reeds. It was not until they were touched by Chinese civilisation that they entered upon the evolutionary course which has ended in a somewhat naïve preference of the civilisation of the West.

There is a difference between symbolism, which all races of men have practised, and art. The reindeer and mammoth drawings of the Cave-men show that a faculty of correct and even spirited drawing was developed at a very early stage

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